Ser. 10/921,089

(12) UK Patent Application (19) GB (11) 2 207 002 (13) A

(43) Application published 18 Jan 1989

(21) Application No 8813635

(22) Date of filing 9 Jun 1988

(30) Priority data
(31) 62/090563 (32) 12 Jun 1987 (33) JP

(71) Applicant
Tanashin Denki Co Ltd

(Incorporated in Japan)

2-19-3 Shinmachi, Setagaya-ku, Tokyo 154

(72) Inventor
Kunio Kido

(74) Agent and/or Address for Service
Graham Watt & Co
Riverhead, Sevenoaks, Kent, TN13 2BN

(51) INT CL⁴
H01H 9/20

(52) Domestic classification (Edition J):
H1N 729 73X 853 854 PR
E2A 106 160 193 412 MA
G5R B98
U1S 2107 E2A G5R H1N

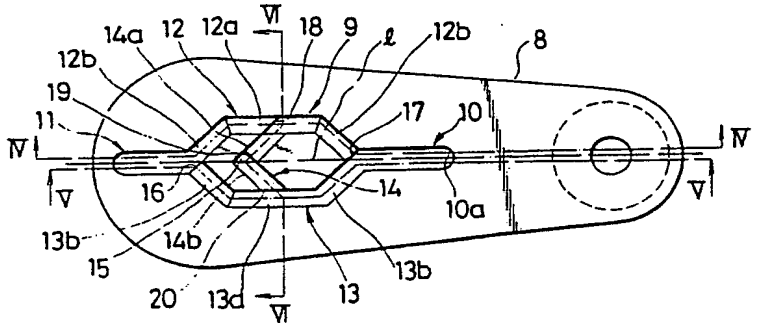
(56) Documents cited
None

(58) Field of search
E2A
G5R
H1N
Selected US specifications from IPC sub-class
H01H

(54) Push-button selective operating mechanism

(57) A push-button selective operating mechanism which allows a push button to be either latched in a pushed in position or returned to a rest position comprises a synthentic resin member (8) having a cam groove (9) formed therein, and an engaging pin held in engagement with and movable along the cam groove (9). The cam groove (9) has lineal portions (10) and (11), a forward path portion (12) interconnecting the lineal portions (10, 11), a return path portion (13) interconnecting the lineal portions (10, 11) and a bypass portion (14) interconnecting the forward and return path portions (12, 13). The cam groove (9) is so profiled at various junctions (16-20) as to prevent return movement of the pin. When the push button is moved against the force of a return spring to cause the pin to move to a position in the forward path portion (12) just beyond the bypass portion (14), the pin will be latched in the pushed in position (15) formed in the bypass portion (14) when the push button is released. The push button is returned to the rest position when it is pushed again. If the push button is pushed in by a greater distance to cause the pin to enter the lineal portion (10), it will return to the rest position when released.

FIG. 2



GB 2 207 002 A

2007002

FIG. 1

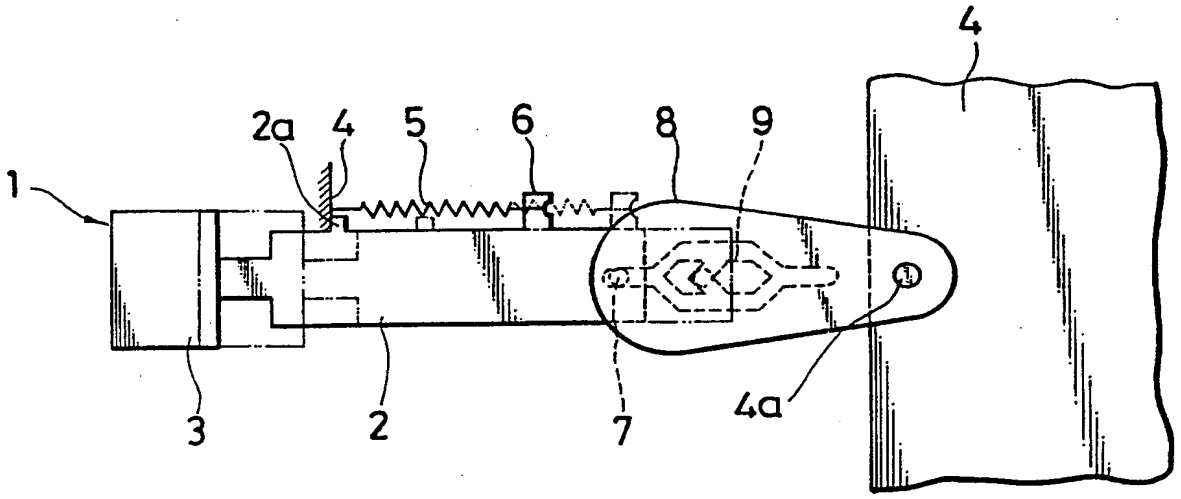


FIG. 2

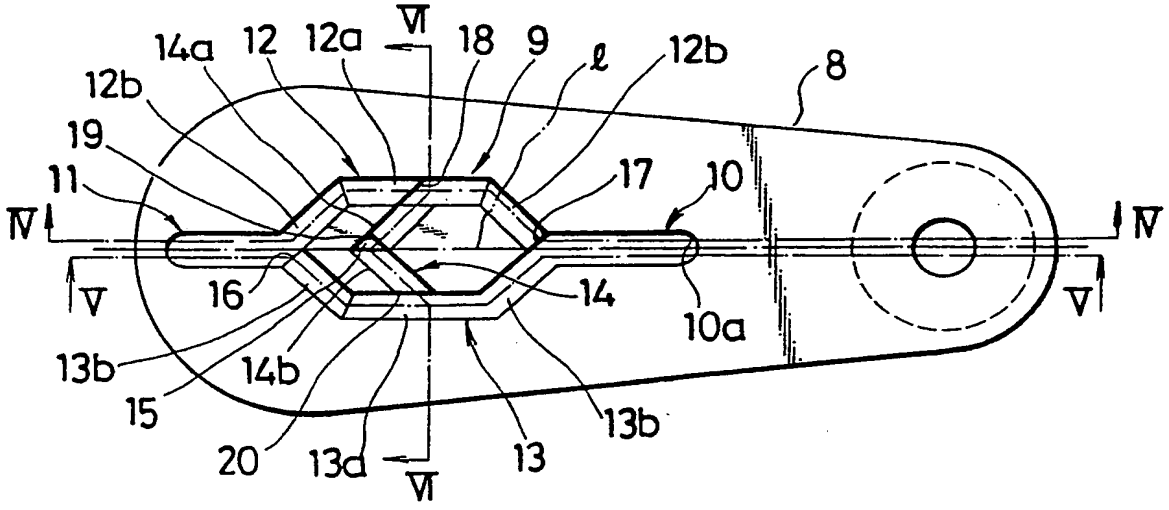


FIG. 3

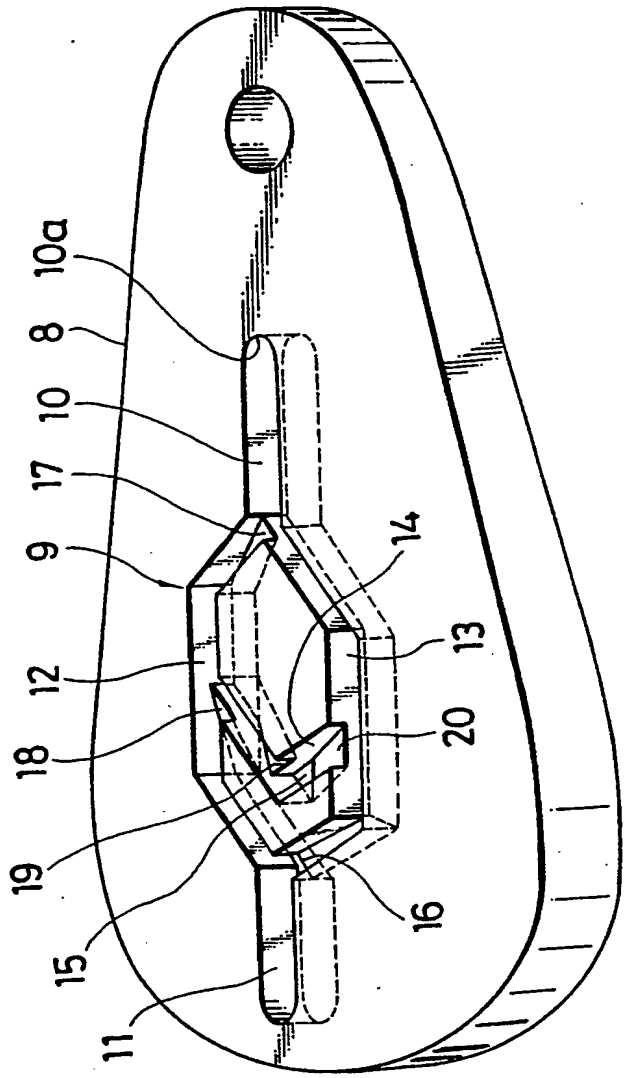


FIG. 4

2207002

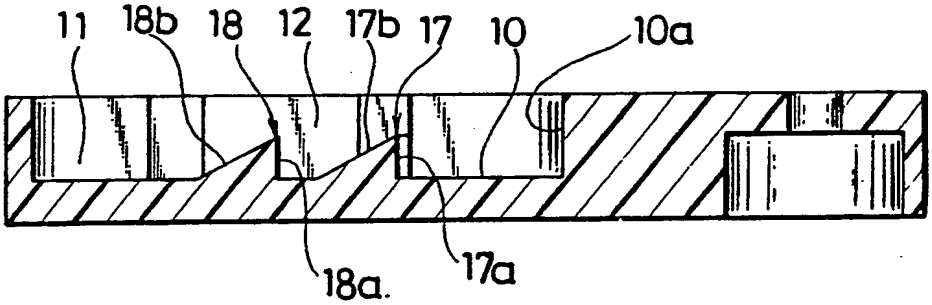


FIG. 5

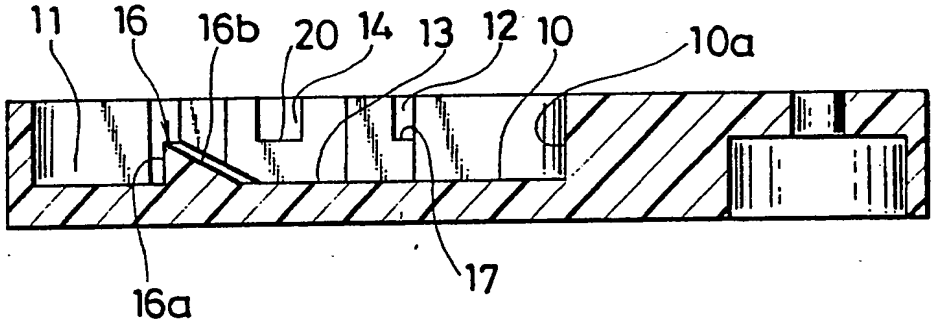


FIG. 6

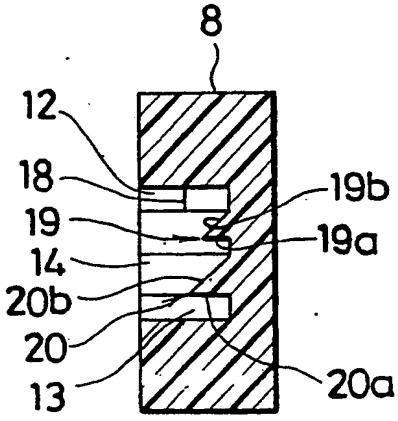


FIG. 7

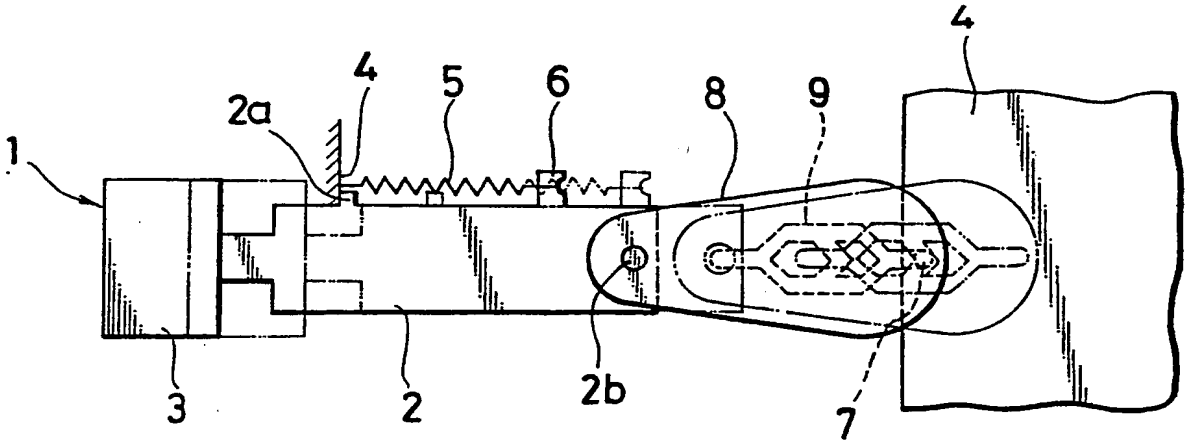


FIG. 8

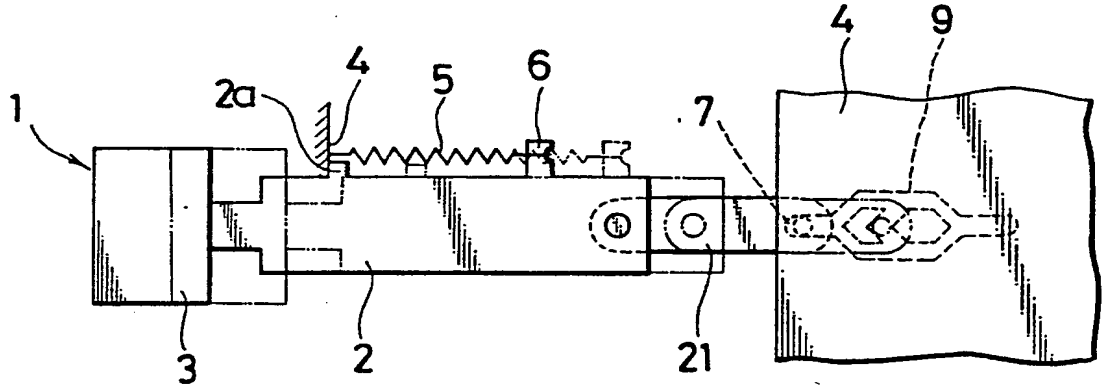
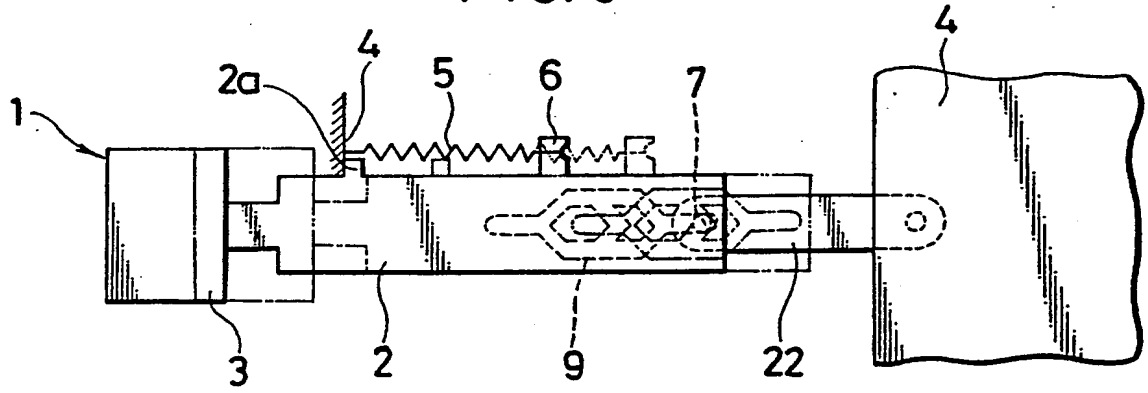


FIG. 9



PUSH-BUTTON TYPE SELECTIVE OPERATING MECHANISM

BACKGROUND OF THE INVENTION

1) Field of the Invention

This invention relates to a push-button type selective operating mechanism for use, for example, with a tape recorder.

2) Description of the Prior Art

A push-button type selective operating mechanism is already known, for example, by Japanese Utility Model Publication No. 56-11248, which is constituted such that, if a push-button is pushed in from its home position by a relatively small distance to a predetermined position against a biasing force of a return spring therefor and then the pushing in force is removed, then the push-button is arrested at a predetermined pushed in position, and if the push-button is pushed in farther than the predetermined position or the predetermined pushed in position and then the pushing in force is removed, then the push-button is returned to its home position by the biasing force of the return spring.

Such a conventional push-button type selective

operating mechanism necessitates a dual function torsion coil spring for establishing appropriate cooperation between a cam face of a lock lever and a cam follower element or engaging pin of a push-button or operating lever. In particular, such a torsion coil spring has a first function of exerting a biasing force to turn the lock lever in one direction around a fixed axis and a second function of exerting a biasing force to turn the lock lever in one direction in a plane of the axis. Provision of the lock lever requires further provision of a stopper for anchoring an end portion of the torsion soil spring and also for defining a limit position of turning motion of the lock lever in the one direction around the fixed axis.

Where the biasing force of the torsion coil spring is excessively strong, there is the enough possibility that the cam follower element or engaging pin of the operating lever or push-button may not be arrested by an arresting portion of the lock lever but may ride under a communicating portion of the lock lever and fail to arrest the operating lever at its predetermined pushed in position. On the contrary, where the biasing force of the torsion coil spring is too weak, there is the possibility that a predetermined force to turn the lock lever in the opposite direction

may not be assured. It is thus very difficult to set the biasing force of the torsion coil spring to a "just enough" condition.

Meanwhile, it is necessary for the operating lever or push-button to have a positively defined maximum pushed in position. To this end, a position limiting means is provided separately. Besides, since the positional relationship between the operating lever and the lock lever must be set with a high degree of accuracy, a high degree of accuracy in assembly is required.

Accordingly, the conventional push-button type selective operating mechanism is complicated in construction, great in number of parts, high in difficulty in assembling operation, low in mass-productivity and high in production cost.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a push-button type selective operating mechanism which is simple in construction, reduced in number of parts, easy in assembling operation and reduced in production cost.

In order to attain the object, according to the present invention, there is provided a push-button type

selective operating mechanism wherein, if a push-button is pushed in from its home position by a relatively small distance to a predetermined position against a biasing force of a return spring therefor and then the pushing in force is removed, then the push-button is arrested at a predetermined pushed in position, and if the push-button is pushed in farther than the predetermined position or the predetermined pushed in position and then the pushing in force is removed, then the push-button is returned to its home position by the biasing force of the return spring, characterized in that it comprises a synthetic resin member having a cam groove formed therein, and an engaging pin held in engagement with and movable along the cam groove, the cam groove having a deep pushing allowing portion, a returning allowing portion, a forward path portion, a return path portion, a bypass portion, an arresting portion, and first, second, third, fourth and fifth guide portions, the deep pushing allowing portion being formed linearly in the pushing in direction of the push-button such that it allows the push-button to be pushed in by a relatively great distance to a position farther than the predetermined position and defines a maximum pushed in position of the push-button, the returning allowing portion being formed linearly in the pushing in

direction of the push-button such that it allows the push-button to return to its home position, each of the forward path portion and the return path portion being provided such that it interconnects an end of the deep pushing allowing portion and an end of the returning allowing portion, the bypass portion being provided such that it interconnects an intermediate location of the forward path portion and an intermediate location of the return path portion, the arresting portion being formed at an intermediate portion of the bypass portion such that it may releasably arrest the engaging pin thereat to arrest the push-button at the predetermined pushed in position, the first guide portion being formed between the returning allowing portion and the return path portion such that it allows advancement of the engaging pin from the return path portion into the returning allowing portion but prevents advancement of the engaging pin from the returning allowing portion into the return path portion, the second guide portion being formed between the deep pushing allowing portion and the forward path portion such that it allows advancement of the engaging pin from the forward path portion into the deep pushing allowing portion but prevents advancement of the engaging pin from the deep pushing allowing portion into the forward path portion, the third guide

portion being formed at a diverging position between the forward path portion and the bypass portion such that it allows advancement of the engaging pin from the forward path portion to the diverging position but prevents advancement of the engaging pin from the diverging position into the forward path portion, the fourth guide portion being formed at an intermediate location of the bypass portion such that it allows advancement of the engaging pin from the diverging position to the arresting portion but prevents advancement of the engaging pin from the arresting portion to the diverging position, the fifth guide portion being formed between the return path portion and the bypass portion such that it allows advancement of the engaging pin from the arresting portion to the return path but prevents advancement of the engaging pin from the return path portion to the arresting portion.

With the push-button type selective operating device, if the push-button is manually pushed in by a relatively small distance from its home position to a predetermined position and then the pushing in force is removed, the engaging pin is guided into the forward path portion of the cam groove from the returning allowing portion and then passes the third guide portion whereafter it is guided into the bypass portion. After

then, the engaging pin passes passes the fourth guide portion and is finally arrested by the arresting portion. Consequently, the push-button is arrested at the predetermined pushed in position.

If the push-button is manually pushed in by some distance from the predetermined pushed in position and then the pushing in force is removed, the engaging pin is guided from the arresting portion past the fifth guide portion into the return path portion and then past the first guide portion into the returning allowing portion so that the push-button is finally returned to its home position.

If the push-button is manually pushed in by a relatively great distance from the home position farther than such a predetermined position and then the pushing force is removed, the engaging pin is guided into the forward path portion from the returning allowing portion and then passes the third and second guide portions successively whereafter it is guided into the deep pushing allowing portion. After then, the engaging pin is guided into the return path portion from the deep pushing allowing portion and then past the first guide portion into the returning allowing portion so that the push-button is finally returned to its home position.

With the push-button type selective operating

mechanism of the present invention, since the engaging pin is always held in engagement with the cam groove, a spring for exerting a biasing force to bias a lock lever to pivot in one direction as in the conventional arrangement described above can be eliminated. Consequently, a stopper for defining a limit position of the pivotal motion of the lock lever in the one direction can also be eliminated. Further, for example, if the synthetic resin member has a suitable resiliency, a spring for biasing the synthetic resin member to keep engagement between the cam groove and the engaging pin may be eliminated. Besides, since the engaging pin is movable only along the cam groove, the accuracy in relative position between the cam groove and the engaging pin upon assembly can be moderated.

In addition, since the stopper wall is provided at the deep pushing allowing portion of the cam groove, there is no need of provision of a special means for defining the maximum pushed in position of the push-button.

After all, the push-button type selective operating mechanism of the present invention is significantly simplified in construction, reduced in number of parts, facilitated in assembling operation, improved in mass-productivity, and reduced in production

cost.

Specific embodiments of the present invention will now be described in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a push-button type selective operating mechanism showing a preferred embodiment of the present invention;

FIG. 2 is a side elevational view, in an enlarged scale, showing detailed construction of a hook of the push-button type selective operating mechanism of FIG. 1;

FIG. 3 is a perspective view, in a further enlarged scale, of the hook of FIG. 2;

FIG. 4 is a sectional view taken along line IV-IV of FIG. 2;

FIG. 5 is a sectional view taken along line V-V of FIG. 2;

FIG. 6 is a sectional view taken along line VI-VI of FIG. 2; and

FIGS. 7 to 9 are views similar to FIG. 1 but showing individually different embodiments of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Referring first to FIG. 1, there is shown a push-button type selective operating mechanism according to the present invention. The push-button type selective operating mechanism shown includes a push-button 1 which includes a lever 2 and a push-button body 3 mounted at an end of the lever 2. The push-button 1 is mounted for sliding movement in leftward and rightward directions in FIG. 1 on a chassis 4 and normally biased in the leftward direction in FIG. 1 by a return spring 5 in the form of a tension coil spring. The return spring 5 is secured at an end thereof to a predetermined location of the chassis 4 and anchored at the other end thereof to a spring anchoring lug 6 formed on and extending laterally from an upper longitudinal edge of the lever 2. A stopping projection 2a extends laterally from the upper longitudinal edge of the lever 2 and is located for abutting engagement with the chassis 4 to positively define a home position of the push-button 1. An engaging pin or cam follower element 7 is securely mounted at a substantially widthwise central location of a side face of an end portion of the lever 2 remote from the push-button body 3. The engaging pin 7 is held in engagement with and movable along a cam groove 9 formed

on one side face of a hook 8 which is made of a suitable synthetic resin. The hook 8 has an elongated egg-shape in side elevation such that a right-hand side end thereof in FIG. 1 presents a smaller radius of curvature than the other or left-hand side end thereof. The hook 8 is supported at a right-hand side end portion thereof for pivotal motion around a fixed axis provided by a pin 4a secured to the chassis 4 and also for limited rocking motion laterally in a plane of the fixed axis. The hook 8 is normally biased in a direction in a plane of the fixed axis therefor so that a bottom face of the cam groove 9 may be held in engagement with the end of the engaging pin 7. Such a biasing force is preferably exerted by a spring not shown, but may be provided otherwise by resiliency of the hook 8 itself which is made of a suitable synthetic resin.

When the push-button 1 is manually pushed in to move in the rightward direction in FIG. 1 against the biasing force of the return spring 5 or when the push-button is returned in the leftward direction by the biasing force of the return spring 5, the engaging pin 7 thereon moves along the cam groove 9 of the hook 8 while pivoting and/or rocking the hook 8 around the fixed axis and/or in the plane of the fixed axis provided by the pin 4a on the chassis 4.

Referring now to FIGS. 2 to 6, the cam groove 9 of the hook 8 is composed of a deep pushing allowing portion 10, a returning allowing portion 11, a forward path portion 12, a return path portion 13, a bypass portion 14, an arresting portion 15, and first, second, third, fourth and fifth guide portions 16, 17, 18, 19 and 20, respectively.

The deep pushing allowing portion 10 is formed linearly in the pushing in direction of the push-button 1, such that it allows the push-button 1 to be pushed in to a position farther than a predetermined position and defines a maximum pushed in position of the push-button 1. The deep pushing allowing portion 10 is located on a line ℓ of the longitudinal axis of the hook 8 and formed over a predetermined distance. The deep pushing allowing portion 10 is connected at a left end thereof in FIG. 2 to the forward path portion 12 and the return path portion 13 and has, at the other end thereof, a stopper wall 10a for engaging with the engaging pin 7 to define the maximum pushed in position of the push-button 1.

The returning allowing portion 11 is formed linearly in the pushing in direction of the push-button such that it allows returning of the push-button 1 to its home position. The returning allowing portion 11 is

located on the longitudinal axial line ℓ of the hook 8 and formed over a predetermined distance. The returning allowing portion 11 is connected at one end thereof to the forward path portion 12 and the return path portion 13 which will be hereinafter described.

Each of the forward path portion 12 and the return path portion 13 interconnects an end of the deep pushing allowing portion 10 and an end of the returning allowing portion 11. The forward path portion 12 and the return path portion 13 are formed in a spaced symmetrical relationship from each other with respect to the longitudinal axial line ℓ of the hook 8. Each of the forward path portion 12 and the return path portion 13 is composed of a straight portion 12a or 13a extending in parallel to the longitudinal axial line ℓ of the hook 8, and a pair of inclined portions 12b or 13b provided contiguously to the opposite ends of the straight portions 12a or 13a, respectively. The other ends of the inclined portions 12b and 13b are individually connected to the left end in FIG. 2 of the deep pushing allowing portion 10 and the right end in FIG. 2 of the returning allowing portion 11.

The bypass portion 14 of the cam groove 9 interconnects an intermediate location of the forward path portion 12 and an intermediate location of the

return path portion 13. The bypass portion 14 has a substantially L-shape in side elevations as particularly seen in FIG. 2 and is composed of an upper half 14a and a lower half 14b. The upper half 14a extends substantially in parallel to a left-hand side one in FIG. 2 of the inclined portions 12b of the forward path portion 12 adjacent the returning allowing portion 11 from the straight portion 12a of the forward path portion 12. The lower half 14b of the bypass portion 14 extends substantially in parallel to a left-hand side one in FIG. 2 of the inclined portions 13b of the return path portion 13 adjacent the returning allowing portion 11 from the straight portion 13a of the return path portion 13

The arresting portion 15 of the cam groove 9 is formed at an intermediate location between the upper and lower halves 14a and 14b of the bypass portion 14 such that it may releasably arrest the engaging pin 7 thereat to arrest the push-button 1 at the predetermined pushed in position.

The first guide portion 16 of the cam groove 9 is formed between the returning allowing portion 11 and the return path portion 13 such that it allows advancement of the engaging pin 7 from the return path portion 13 into the returning allowing portion 11 but prevents

advancement of the engaging pin 7 from the returning allowing portion 11 into the returning path portion 13. The first guide portion 16 is projected from the bottom face of the inclined portion 13b of the return path portion 13 adjacent the returning allowing portion 11. The first guide portion 16 has a vertical face 16a located at the boundary between the returning allowing portion 11 and the return path portion 13 and extending laterally from the bottom face of returning allowing portion 11, and an inclined face 16b interconnecting the lateral end of the vertical face 16a and the bottom face of the return path portion 13 as particularly seen in FIG. 5. When the engaging pin 7 passes the inclined face 16b of the first guide portion 16 from the return path portion 13 to the returning allowing portion 11, the hook 8 is pushed by the engaging pin 7 to pivot in the one direction in a plane of the fixed axis of the pin 4a (FIG. 1) of the chassis 4 against the biasing force exerted either by the spring not shown or by the resiliency of the hook 8 itself as described hereinabove. Then when the engaging pin 7 passes the end of the vertical face 16a, the hook 8 is pivoted back in the opposite direction in a plane of the fixed axis of the pin 4a.

The second guide portion 17 of the cam groove 9

is formed between the deep pushing allowing portion 10 and the forward path portion 12 such that it allows advancement of the engaging pin 7 from the forward path portion 12 into the deep pushing allowing portion 10 but prevents advancement of the engaging pin 7 from the deep pushing allowing portion 10 into the forward path portion 12. The second guide portion 17 extends laterally from the bottom face of the inclined portion 12b of the forward path portion 12 adjacent the deep pushing allowing portion 10. The second guide portion 17 has a vertical face 17a located at the boundary between the deep pushing allowing portion 10 and the forward path portion 12 and extending laterally from the bottom face of the deep pushing allowing portion 10, and an inclined face 17b interconnecting the end of the vertical face 17a and the bottom face of the forward path portion 12 as particularly seen in FIG. 4. When the engaging pin 7 passes the second guide portion 17, the hook 8 is rocked similarly in a plane of the fixed axis of the pin 4a.

The third guide portion 18 is formed at a diverging position between the forward path portion 12 and the bypass portion 14 such that it allows advancement of the engaging pin 7 from the forward path portion 12 to the diverging position but prevents

advancement of the engaging pin 7 from the diverging position into the forward path portion 12. The third guide portion 18 is projected laterally from the bottom face of an intermediate location of the straight portion 12a of the forward path portion 12. The third guide portion 18 has a vertical face 18a located at the boundary between the forward path portion 12 and the bypass portion 14 and extending laterally from the bottom face of the forward path portion 12, and an inclined face 18b interconnecting the end of the vertical face 18a and the bottom face of the forward path 12 as seen in FIG. 4. When the engaging pin 7 passes the third guide portion 18, the hook 8 is rocked in a plane of the fixed axis of the pin 4a.

The fourth guide portion 19 is formed at an intermediate position of the bypass portion 14 adjacent the arresting portion 15 such that it allows advancement of the engaging pin 7 from the upper half 14a of the bypass portion 14 to the arresting portion 15 but prevents advancement of the engaging pin 7 from the arresting portion 15 to the upper half 14a of the bypass portion 14. The fourth guide portion 19 is projected laterally from the bottom face of the bypass portion 14. The fourth guide portion 19 has a vertical face 19a located adjacent the arresting portion 15 and extending

laterally from the bottom face of the arresting portion 15, and an inclined face 19b interconnecting the end of the vertical face 19a and the bottom face of the forward path portion 12 as seen in FIG. 6. When the engaging pin 7 passes the fourth guide portion 19, the hook 8 is rocked in a plane of the fixed axis of the pin 4a.

The fifth guide portion 20 is formed between the return path portion 13 and the lower half 14b of the bypass portion 14 such that it allows advancement of the engaging pin 7 from the arresting portion 15 to the return path portion 13 but prevents advancement of the engaging pin 7 from the return path portion 13 into the lower half 14b of the bypass portion 14. The fifth guide portion 20 is projected laterally from the bottom face of the lower half 14b of the bypass portion. The fifth guide portion 20 has a vertical face 20a located at the boundary between the return path portion 13 and the bypass portion 14 and extending laterally from the bottom face of the return path portion 13, and an inclined face 20b interconnecting the end of the vertical face 20a and the bottom face of the lower half 14b of the bypass portion 14 as seen in FIG. 6. When the engaging pin 7 passes the fifth guide portion 20, the hook 8 is rocked in a plane of the fixed axis of the pin 4a.

Subsequently, operation of the push-button type selective operating mechanism of the present invention having such construction as described above will be described.

If the push-button 1 is manually pushed in by a relatively small distance to the predetermined position from its home position indicated in solid lines in FIG. 1, the engaging pin 7 on the push-button 1 successively passes the returning allowing portion 11, one of the inclined portions 12b of the forward portion 12 contiguous to the returning allowing portion 11, and the inclined face 18b and the vertical face 18a of the third guide portion 18 and reaches a substantially intermediate location of the straight portion 12a of the forward path portion 12, that is, the diverging position between the forward path portion 12 and the bypass portion 14. When the engaging pin 7 passes the inclined portion 12b of the forward path portion 12, the hook 8 is pivoted in the clockwise direction in FIG. 1 around the fixed axis of the pin 4a.

If the pushing in force of the push-button 1 is subsequently removed at a point of time just after the engaging pin 7 reaches the diverging position between the forward path portion 12 and the bypass portion 14, the push-button 1 is moved a little toward its home

position side by the biasing force of the return spring 5, and upon such movement, the engaging pin 7 is guided into the bypass portion 14 and successively passes the inclined face 19b and the vertical face 19a of the fourth guide portion 19 whereafter it is arrested by the arresting portion 15. Consequently, the push-button 1 is arrested at the predetermined pushed in position as indicated by two dot chain lines in FIG. 1. When the engaging pin 7 moves from the diverging position past the upper half 14a of the bypass portion 14 to the arresting portion 15, the hook 8 is pivoted in the counterclockwise direction in FIG. 1.

In this manner, if the push-button 1 is manually pushed in by a relatively small distance from its home position to a predetermined position and then the pushing in force is removed, it is arrested at the predetermined pushed in position.

If the push-button 1 is manually pushed in again by a predetermined small distance from the predetermined pushed in position at which it is arrested to a predetermined position against the biasing force of the return spring 5, the engaging pin 7 is guided into the lower half 14b of the bypass portion 14 and successively passes the inclined face 20b and the vertical face 20a of the fifth guide portion 20 whereafter it enters the

straight portion 13a of the return path portion 18. Upon such movement of the engaging pin 7, the hook 8 is pivoted further in the counterclockwise direction in FIG. 1.

If the pushing in force of the push-button 1 is then removed at a point of time just after the engaging pin 7 enters the straight portion 13a of the return path portion 13, the push-button 1 is moved toward its home position by the biasing force of the return spring 5 until the stopping projection 2a thereon is abutted with and stopped by the chassis 4. Upon such movement of the push-button 1, the engaging pin 7 successively passes the straight portion 13a of the return path 13 and one of the inclined portions 13b of the return path 13 adjacent the returning allowing portion 11 and enters the returning allowing portion 11. Consequently, the push-button 1 is stopped at its home position as indicated in solid lines in FIG. 1. When the engaging pin 7 passes the inclined portion 13b of the return path portion 13, the hook 8 is pivoted back in the clockwise direction in FIG. 1.

If the push-button 1 is manually pushed in by a relatively great distance to a predetermined position, the engaging pin 7 thereon successively passes the returning allowing portion 11, one of the inclined

portions 12b of the forward path portion 12 contiguous to the returning allowing portion 11, the inclined face 18b and the vertical face 18a of the third guide portion 18, the straight portion 12a and the other inclined portion 12b of the forward path portion 12, and the inclined face 17a and the vertical face 17b of the second guide portion 17 and enters the deep pushing allowing portion 10 whereafter it is abutted with and stopped by the stopper wall 10a of the deep pushing allowing portion 17. When the engaging pin 7 passes the other inclined portion 12b, the hook 8 is pivoted back in the counterclockwise direction in FIG. 1.

If the pushing in force of the push-button 1 is removed at such a maximum pushed in position of the push-button 1, the push-button 1 is moved toward its home position by the biasing force of the return spring 5. Upon such movement of the push-button 1, the engaging pin 7 thereon successively passes the deep pushing allowing portion 10, one of the inclined portions 13b of the return path portion 13 adjacent the deep pushing allowing portion 10, the straight portion 13a and the other inclined portion 13b of the return path portion 13, and the inclined face 20b and the vertical face 20a of the fifth guide portion 20 and then enters the returning allowing portion 11. The push-

button 1 is finally held at its home position as indicated in solid lines in FIG. 1. When the engaging pin 7 passes the inclined portion 13b of the return path portion 13 adjacent the deep pushing allowing portion 10, the hook 8 is pivoted further in the counterclockwise direction in FIG. 1.

In this manner, if the push-button 1 is manually pushed in by a relatively great distance from its home position to its maximum pushed in position and then the pushing in force is removed, it is reciprocally moved between its home position and its maximum pushed in position without being arrested at its predetermined pushed in position.

FIGS. 7 to 9 show different push-button type selective operating mechanisms embodying the present invention. The push-button type selective operating mechanisms shown in FIGS. 7 to 9 have basically similar constructions to that of the push-button type selective operating mechanism of FIGS. 1 to 6 described above. In FIGS. 7 to 9, therefore, like parts or elements are denoted by like reference symbols to those of FIGS. 1 to 6, and overlapping description will be omitted herein.

Referring to FIG. 7, there is shown a second preferred embodiment of the present invention wherein a hook 8 on which a cam groove 9 is formed is supported at

a smaller curvature end portion thereof for pivotal motion around an axis provided by a pin 2b on a lever 2 of a push-button 1 and also for limited rocking motion in a plane of the axis of the pin 2b. An engaging pin 7 for engaging with the cam groove 9 is thus securely mounted at a predetermined location of a chassis 4.

FIG. 8 shows a third embodiment of the present invention wherein such a hook 8 as in the first or second embodiment described hereinabove is omitted and a cam groove 9 is formed at a predetermined location of a chassis 4 which is made of a synthetic resin. An engaging pin 7 for engaging with the cam groove 9 is securely mounted at an end portion of a link member 21 which is supported at the other end portion thereof for pivotal motion and for limited rocking motion on a lever 2 of a push-button 1.

FIG. 9 shows a fourth embodiment of the present invention wherein such a hook 8 is similarly omitted and a cam groove 9 is formed on a lever 2 of a push button 1. The lever 2 here is made of a synthetic resin. An engaging pin 7 for engaging with the cam groove 9 is securely mounted at an end portion of a link member 22 which is connected at the other end portion thereof for pivotal motion and for limited rocking motion at a predetermined location of a chassis 4.

CLAIMS:

1. A push-button type selective operating mechanism wherein, if a push-button is pushed in from its home position by a relatively small distance to a predetermined position against a biasing force of a return spring therefor and then the pushing in force is removed, then said push-button is arrested at a predetermined pushed in position, and if said push-button is pushed in farther than the predetermined position or the predetermined pushed in position and then the pushing in force is removed, then said push-button is returned to its home position by the biasing force of said return spring, characterized in that it comprises a synthetic resin member having a cam groove formed therein, and an engaging pin held in engagement with and movable along said cam groove, said cam groove having a deep pushing allowing portion, a returning allowing portion, a forward path portion, a return path portion, a bypass portion, an arresting portion, and first, second, third, fourth and fifth guide portions, said deep pushing allowing portion being formed linearly in the pushing in direction of said push-button such that it allows said push-button to be pushed in by a relatively great distance to a position farther than the

predetermined position and defines a maximum pushed in position of said push-button, said returning allowing portion being formed linearly in the pushing in direction of said push-button such that it allows said push-button to return to its home position, each of said forward path portion and said return path portion being provided such that it interconnects an end of said deep pushing allowing portion and an end of said returning allowing portion, said bypass portion being provided such that it interconnects an intermediate location of said forward path portion and an intermediate location of said return path portion, said arresting portion being formed at an intermediate portion of said bypass portion such that it may releasably arrest said engaging pin thereat to arrest said push-button at the predetermined pushed in position, said first guide portion being formed between said returning allowing portion and said return path portion such that it allows advancement of said engaging pin from said return path portion into said returning allowing portion but prevents advancement of said engaging pin from said returning allowing portion into said return path portion, said second guide portion being formed between said deep pushing allowing portion and said forward path portion such that it allows advancement of said engaging

pin from said forward path portion into said deep pushing allowing portion but prevents advancement of said engaging pin from said deep pushing allowing portion into said forward path portion, said third guide portion being formed at a diverging position between said forward path portion and said bypass portion such that it allows advancement of said engaging pin from said forward path portion to the diverging position but prevents advancement of said engaging pin from the diverging position into said forward path portion, said fourth guide portion being formed at an intermediate location of said bypass portion such that it allows advancement of said engaging pin from the diverging position to said arresting portion but prevents advancement of said engaging pin from said arresting portion to the diverging position, said fifth guide portion being formed between said return path portion and said bypass portion such that it allows advancement of said engaging pin from said arresting portion to said return path but prevents advancement of said engaging pin from said return path portion to said arresting portion.

2. A push-button type selective operating mechanism as set forth in claim 1, wherein said synthetic resin member is supported at an end portion

thereof at least for pivotal motion around a fixed axis and said engaging pin is securely mounted at an end portion of said push-button.

3. A push-button type selective operating mechanism substantially as any one of the embodiments hereinbefore described with reference to, and as shown in, the accompanying drawings.

Published 1988 at The Patent Office State House, 66 71 High Holborn, London WC1R 4TP. Further copies may be obtained from The Patent Office.